

THE BLUE RAM is the most exciting thing out these days, primarily because it is a real piece of equipment - and available. Deliveries started last week.

Cost data is: Complete - wired 170.

Complete - kit (o) 130.

Bare kit with power(\*) 70. (send orders to Robert Fabris--)

Bare kit without power 60. (personal checks for these are ok)

(o) About 80% of the kit's construction requires wire wrapping, and 5% is soldering, while the remainder is mechanical assembly. Wire wrapping is a technique that tightly twists a wire around a post, ensuring a mechanical and electrical connection - no heat required - but a tool is. A tool by "OK" retails at 14.95 at electronic shops. This is in the middle of the price bracket.

(\*) A regulated power supply is needed, 6 vDC at .5 amp.

The difference between the complete and bare kits is in the RAM itself. The chips used are type 2114, two per K. Actually, we can supply the amount of RAM you desire- 1,2,3, or 4K, at a rate of \$15 per K. The chips are 450nsec max speed, by TI - no surplus or unlabelled stock. Kit building instructions and documentation of course.

The small box (see last month's illustration) contains two main parts, the RAM and its controlling items, and the connector at the top left to interface with the outside world plus its associated parts. The box attaches directly to the 50-pin connector in the back and is supported by it. This concept eliminates any possible problem with interferences or losses due to a cable. In use, it will cover up hand controller 4's connection.

The project includes a self-diagnostic capability. Essentially the machine programs a WRITE statement to an address, then a READ statement and compares the two. If they are different, a picture of the BLUE RAM shows up on the screen and the errant chip is indicated with a ? and a statement.

The project also includes a utility program for loading machine language, and three are built-in. 1) enables a multi-color screen with eight colors full width, plus a split screen (similar to &(9)) to give 16. 2) switches control to a machine code program or routine which starts at 6000H. We will include such programs in the ARCADIAN for our mutual understanding. and 3) which is used to copy a game cassette.

## ADDED MEMORY, what's it all about???

As a computer, the Bally has a very small usable memory size. We were very surprised to find that there was only 1.8K of RAM really available - it was touted at 4K. While the designers did clever short-cut tricks, we find there is not much to work with. As you've seen in previous issues, our subscribers have come up with some clever utilizations of that space, but... We very early discovered that the instructions imposed in the Bally BASIC cartridge will not allow access to any memory over 1800 bytes, regardless of how much is added physically. Another area of memory is the location of stored data, or 'strings', which is normally about 874 bytes. There is an interaction between string memory and BASIC memory, if one goes up, the other goes down. It is possible to add more string memory without affecting the BASIC memory, and that is what the BLUE RAM does in one mode. It can access over 2000 bytes of string, starting at @(24576), and thereby allow the BASIC



memory to be used for program.

Machine language programs, however, can be stored in the BLUE RAM to its full capability of 4096 bytes (4K). The Bally BASIC is used to "turn on" access to the extended memory (starting at location 6000H) and is essentially bypassed after that so it doesn't "know" how many memory locations are used. A sample program is included later in this issue, and will be a feature as we progress. Eventually, we will be able to produce games of Bally VIDEOCADE quality, because we will be able to understand their programming techniques. Item 3) of the utility program, mentioned above, did you catch that? Any VIDEOCADE can be loaded into the BLUE RAM (except Bally BASIC). Once in there, it is just like any program you put in manually or via tape. It can be looked at, it can be RUN, it can be LISTed, it can be modified, it can be stored on tape. You can change the odds, speed up plays, put in red grass, etc., and learn how things can be done.

As indicated above, Bally BASIC will not access more than 1800 bytes of memory, so the BLUE RAM as a BASIC memory aid (or any other memory addition) is constrained by the BASIC cartridge. What is needed is an operating system without that constraint...

AN EXTENDED BASIC for the Bally is now being programmed. It has an 8K ROM, twice as much as the current unit, and will be able to access the 4K RAM of the BLUE RAM. It will also be capable of accessing the input/output ports of the BLUE RAM in order, amongst other things, to be able to have direct access to a tape recorder and be able to transfer data 6 times as fast, or 1800 baud. This version will not use screen memory, therefore 4 colors will be available. Expected date of availability is November, and expected price is in the \$75 area. More details will follow as the various enhancements are incorporated. About 95% of existing programs will be operable with the new system... I'd appreciate an indication of your interest in it.

Now that we are rolling along on a new language that will be compatible with both old programs plus the memory addition of the BLUE RAM, the next step is an upgrading of the BLUE RAM, because this new BASIC will be able to access even more memory...

EXPANDED BLUE RAM will have an additional capacity of 12K by a plug-in to the currently available unit. With a total of 16K, we will be able to directly compete with just about any machine now available. Actually, more RAM could be added if some power modifications were made, but it seems that a repackaging scheme would be better (perhaps a board full of RAM that is mounted to the underside of the Bally in a shallow pan...).

#### ADDITIONAL CAPABILITIES:

RAM into ROM. One of the switches on the top of the box is used in the VIDEOCADE-RAM transfer, while the other will disable the WRITE functions to the RAM so that you cannot change what is in there. This capability is also available through the keypad or a program. The box therefore becomes a ROM, and since it has its own power supply, you can remove the box from the Bally and put it on a shelf without losing the program.

INPUT/OUTPUT. The big connector on top (a Zero Insertion Force, ZIF) has 24 connections I am calling ports. 20 of these are for the 16 actual input-output ports, their power and grounds; while the other 4 bring up the following from the 50-pin connector:



CLOCK, AUDIO, WAIT, I/O REQ, which are to be used for the next phases of peripheral addition. This port will allow addition of an unencoded keyboard, such as the JAMECO at \$34.95, and this will be the first of a number of 'gadgets' to be added.

The BLUE RAM contains an 8154 chip that is used, with the Bally BASIC, to "open" any of the ports to allow power passage in or out. Suppose you wanted to monitor a window, and had a 2ma. relay to sound an alarm, the following program might be used:

```
10 IF &(162)#0 GOTO 30
```

```
20 GOTO 10
```

```
30 &(163)=1
```

```
40 PRINT "ALARM ON - WINDOW OPEN"
```

where the relay was activated by line 30.

**MACHINE LANGUAGE:** Normally one directs the operation of the Central Processing Unit (CPU), the Z-80 chip, through commands that have been indelibly engraved into the operating system (called Bally BASIC in our case). We do this by writing a program using familiar commands GOTO, FOR, etc. It is possible to bypass the commands of Bally BASIC and perform operations directly in machine language. It takes a lot more time to do the programming this way, but the program is much faster and can do more things. The usual way is the POKE command,  $\%$ , which was first mentioned on p.25 of Volume 1. You will recall we reached into the ROM and extracted the phrase GAME OVER and put it on the screen. The rules of entering POKEd material into memory also appears there, with the requirement to enter bytes in a reverse manner, and convert to decimal notation. More detail is shown on p.45, V 1, where we created the 2x-size word, and then Dave Ibach's tutorial on pp 78,9, also Vol 1. The following program is written specifically for the BLUE RAM and is presented as a general sample of the type of program to be written. The purpose of this example is to read the values of 8 resistances. Note that hex codes are used now...

#### MACHINE CODE SEGMENT:

```
6000 F3 ED 4B 72 4E 3E 88
6007 D3 A0 D3 A2 0D 20 F7
600E 10 F5 ED 4B 74 4E 3A
6015 6E 4E F6 80 D3 A0 3E
601C 0F D3 A2 DB 87 E7 28
6023 05 0D 20 F8 10 F6 ED
602A 43 70 4E FB C9
```

#### BASIC SEGMENT:

```
10 C=500; D=32767
```

```
20 FOR A=0 TO 7
```

```
30 CALL (24576)
```

```
40 PRINT "LINE ", #1, A, " = "
```

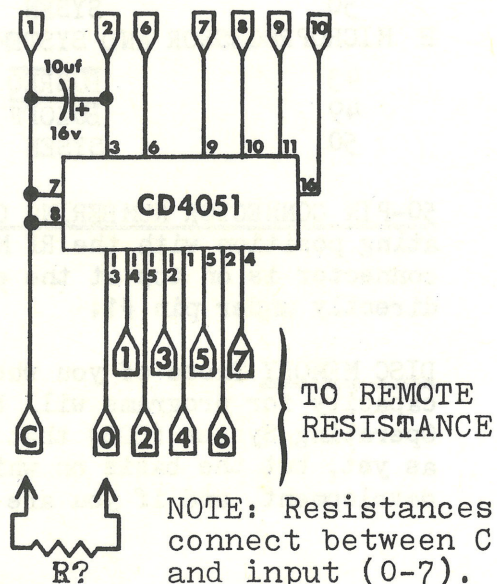
```
50 IF B=0 PRINT "OPEN CIRCUIT"
```

```
60 IF B=32767 PRINT "SHORT CIRCUIT"
```

```
70 PRINT #1, (32767-B)/328-1
```

```
80 NEXT A
```

#### BLUE RAM ZIF SOCKET





MIKE SKALA of Eastlake Ohio would like to get with others in the Cleveland area - call him at 951-2564 in the evenings.

SALVAGE BOARD PROJECT is about done. Hundreds of boards have found their way to new owners, and it looks like the demand has slacked off, enough so that I do not plan to order any more in the near future. I will keep a list of those interested, and when I get enough interest to warrant another order, I'll try again, so send a note if you have a desire. The above is for the as-is boards. Repaired/working boards are still available, at \$70.

For those of you who may have problems after checking the solder joints, opens, shorts, missing/broken pieces, clock, power supply, etc., the following may be of some help. The procedure uses a good board to check out the salvage unit, after isolating some functions. You need two 50-pin connectors and a length of cable, plus a couple of jumpers.

The 16 address lines, 8 data lines, and control lines shown in Table 1 are wired directly from one connector to the other. If you use standard flat wire, cut the unused wires. Table two shows the terminations of the signal lines required for testing the salvage board's microprocessor, and then the system ROM. One additional external connection is required from IC U14 pin#6 on the salvage board (\*) to BUZOFF pin #49 on the 50-pin connector to the working Bally. The CLOCK signal on the salvage board must be removed by lifting one end of R15 (47ohms), and all three custom chips should be removed from the salvage board.

(\*) If your salvage board has the 26-pin connector just to the right of the RESET button, pin#6 of U14 is also available at pin #8 of that connector.

\*\*\* Al Rathmell 1643 Swallow Dr. Sunnyvale, CA 94087\*\*\*

TABLE 1 Connect the following pins of one connector to the same pins on the other connector: 1,6,9,11,13-40,42,46

TABLE 2 CHECKOUT CONNECTOR TEST CONFIGURATIONS

A MICROPROCESSOR TEST

PIN #	SIGNAL	WORKING UNIT	SALVAGE
43	BUSREQ	GROUND	OPEN
49	BUZOFF	U 14-16 (SALVAGE)	GROUND
50	SYSEN	OPEN	GROUND

B MICROPROCESSOR AND SYSTEM ROM TEST

43	BUSREQ	GROUND	OPEN
49	BUZOFF	U 14-16 (SALVAGE)	GROUND
50	SYSEN	GROUND	OPEN

50-PIN CONNECTOR NUMBERING CONVENTION: When the board is in its normal operating position with the RF Modulator to the lower left, Pin #1 of the 50-pin connector is on top at the extreme left. All top pins are odd. Pin#2 is directly under pin #1.

DISC MEMORY Those of you who are interested in a quantum jump in storage capacity for programs will be glad to hear that I have a listing for a Disc Operating System (DOS) that is tailored to the Bally. Not a working system as yet, but the basis on which to build one. This is the first step in development, and if you are interested, drop me a line.



# ARCADIAN

```

1 .
2 .
3 .
4 .CODE
5 .BY RON PICARDI
10 CLEAR
15 FC=7;BC=0
20 PRINT
30 PRINT "MORSE CODE"
35 PRINT
36 INPUT " SPEED?"D
37 NT=D
40 PRINT
60 PRINT "YOUR MESSAGE"
65 PRINT
67 PRINT " ON KEYBOARD,"
68 PRINT
69 PRINT "TYPE WORDS RUN FOR CODE"
70 PRINT
100 B=0
105 B=B+1
110 N=KP
115 IF N=106GOTO 400
120 @(B)=N
130 TV=N
140 GOTO 105
400 BC=FC
405 FOR A=1TO B-1
410 N=@(A)
411 IF N<44GOTO 422
412 IF N>90GOTO 422
413 IF N=47GOTO 422
414 IF N>57IF N<65GOTO 422
418 N=Nb10
420 GOSUB N
422 FOR C=1TO 25bD;NEXT C
425 CLEAR
430 NEXT A
435 GOTO 1000
440 PRINT "Q00 Q00 Q Q Q00 Q00";RETURN
450 PRINT "Q00000000";RETURN
460 PRINT "Q Q00 Q Q00 Q Q00";RETURN
480 PRINT "Q00 Q00 Q00 Q00 Q00";RETURN
490 PRINT "Q Q00 Q00 Q00 Q00";RETURN
500 PRINT "Q Q Q00 Q00 Q00";RETURN
510 PRINT "Q Q Q Q00 Q00";RETURN
520 PRINT "Q Q Q Q00";RETURN
530 PRINT "Q Q Q Q Q";RETURN
540 PRINT "Q00 Q Q Q Q";RETURN
550 PRINT "Q00 Q00 Q Q Q";RETURN
560 PRINT "Q00 Q00 Q00 Q Q";RETURN
570 PRINT "Q00 Q00 Q00 Q00 Q";RETURN
650 PRINT "Q Q00";RETURN
660 PRINT "Q00 Q Q00 Q";RETURN
670 PRINT "Q00 Q Q00 Q";RETURN
680 PRINT "Q00 Q Q";RETURN
690 PRINT "Q";RETURN
700 PRINT "Q Q Q00 Q";RETURN
710 PRINT "Q00 Q00 Q";RETURN
720 PRINT "Q Q Q Q";RETURN
730 PRINT "Q Q";RETURN
740 PRINT "Q Q00 Q00 Q00";RETURN
750 PRINT "Q00 Q Q00";RETURN
760 PRINT "Q Q00 Q Q";RETURN
770 PRINT "Q00 Q00";RETURN
780 PRINT "Q00 Q";RETURN
790 PRINT "Q00 Q00 Q00";RETURN
800 PRINT "Q Q00 Q00 Q";RETURN
810 PRINT "Q00 Q00 Q Q00";RETURN
820 PRINT "Q Q00 Q";RETURN
830 PRINT "Q Q Q";RETURN
840 PRINT "Q00";RETURN
850 PRINT "Q Q Q00";RETURN
860 PRINT "Q Q Q Q00";RETURN
870 PRINT "Q Q00 Q00";RETURN
880 PRINT "Q00 Q Q Q00";RETURN
890 PRINT "Q00 Q Q00 Q00";RETURN
900 PRINT "Q00 Q00 Q Q";RETURN
1000 PRINT "Q Q00 Q Q00 Q"
1005 B=B-1
1010 FC=0;BC=7;NT=0
1020 FOR C=1TO B
1030 TV=@(C)
1050 NEXT C
1060 PRINT " END OF MESSAGE"
1065 NT=3
1070 IF &(22)=16GOTO 10
1080 IF &(23)=8GOTO 100
1110 GOTO 1070

```

MORSE CODE by Ron Picardi is a somewhat advanced program over others I've received. They translated a keypad input directly into code and made an immediate output. Ron, on the other hand, allows you to enter a message up to 200 characters, and then it will transmit the whole thing at a user-entered speed. This makes it ideal for training reception via tapes. And it could be used for on-the-air transmission (under control of a licensed operator, of course.)

Mr. Ronald F. Picardi  
630 Bacon Road  
Saginaw, MI 48603



# ARCADIAN

SUBSEARCH PROGRAM BY \*Ron Picardi... \*

Your mission is to find and destroy the enemy sub before he gets you. You can launch search probes on a 10x10 map. When you have sonar contact, you will have missiles to fire, at three depths.

100-180 search pattern and map  
400-440 contact  
500-650 missile launch and results  
660 ship is torpedoed  
900 sub is hit  
950 try again  
1000 end

Ron has made some comments about the modification to his Black Hole program by Jerry Winn, last issue. Ron originally created a "window", or location which would "win" the game. Actually, there are three windows, depending on whether the game is easy, moderate, or hard. These windows are: X= +14 to +16, Y=+10 to -10; X=+15, Y=+5 to -5; and X=+15, Y=0, respectively. Along with all these is the requirement that C=5 (speed). Jerry's modification opened the windows too much, they encompass the Black Hole and are inside the Cygnus' orbit. To learn more about the program, Ron suggests a GOTO 500 instead of RUN.

MUSIC modification suggested by Bert Holmes should make it easier to change the notes while you are entering them. He proposes that two lines be changed:

```
65 J=J-127; IF J<0 J=J+255
70  $\%(E+Z)=\%(E+Z)\div 256 \times 256+J$ 
```

YAHTZEE modification should allow the use of four players by dropping line 10, which frees up just enough memory.

YAHTZEE modification which improves legibility and frees up some memory was suggested by Rich Tietjens. Change the lines to read:

```
10 :RETURN; CLEAR; BC=12; NT =1
45 GOSUB 90
90 FOR S=49 TO 90; MU=S;NEXT S; RETURN
318 CX=-59;CY=27-DX16;PRINT"←",
320IF JX(B) MU=64;@(D)=0;BOX -71,CY,14,14,2
325IF TR(B) GOSUB 90;D=9;GOTO 335
360 X= -71;Y=27-DX16;Z=RND(6);@(D)=Z
365 BOX X,Y,14,14,1;MU = 70+Z
370 IF Z#Z÷2x2 BOX X,Y,2,2,2
375 IF Z=6 BOX X-4,Y,2,2,2; BOX X+4,Y,2,2,2
380 IF Z=1 BOX X-4,Y+4,2,2,2; BOX X+4,Y-4,2,2,2
385 IF Z=3 BOX X-4,Y-4,2,2,2; Box X+4,Y+4,2,2,2
```

Rich also notes that the new version can be saved with  
:RETURN;:PRINT; FOR A=0 TO 4:PRINT;NEXT A:PRINT "NT=0;NT=2;LIST;PRINT 5;  
PRINT 6;PRINT "RUN

which will allow lines 5 and 6 to be recorder for credit purposes but will automatically delete them from memory each time the game is loaded. The :RETURN command rests NT to 3. The FOR/NEXT loop puts a short leader on the tape. Setting NT to 2 while recording and to 0 while loading helps prevent lost bits on reloads.

PROGRAM TAPES. Dick Houser has labored long and hard to put all of the programs listed in the ARCADIAN onto tapes that he is willing to copy for your use. He has included all the little corrections, and has added lead-in REM (.) statements to give them a uniform look. 635 Los Alamos Ave., Livermore, CA, 94550 to get prices



# ARCADIAN

```

1 .
2 .
3 .SUB SEARCH
4 .BY RON PICARDI
100 X=RND (10);Y=RND (10);U=RND (10);V=RND (10);FC=7;BC=250
110 CLEAR ;BOX 0,0,160,60,1
120 BOX -70+Xb14,-30+Yb6,6,2,3;CY=40;PRINT "ENTER SEARCH 1 TO 10"
130 CY=-35;INPUT Y;CY=-35;CX=0;INPUT X
140 FOR A=0TO X;BOX -70+Ab14,-30,2,2,3;MU="5";BOX -70+Ab14,-30,2,2,3;NEXT A
150 FOR A=0TO Y;BOX -70+Xb14,-30+6bA,2,2,3;MU="5";BOX -70+Xb14,-30+Ab6,2,2,3;NE
XT A
155 IF X=U IF Y=V GOTO 400
160 E=RND (100);IF E=20 GOTO 660
180 GOTO 120
400 CLEAR ;PRINT "SONAR CONTACT"
420 CY=0;PRINT "BATTLE STATIONS"
440 FOR A=1TO 10;(&(18)=30;FOR B=255TO 0STEP -10;(&(22)=B;NEXT B;FOR B=1TO 30;NEX
T B;NEXT A;(&(18)=0
500 X=RND (5);Y=RND (5);Z=RND (3);CLEAR
510 J=2;K=2;L=0;D=RND (4)
515 FOR C=1TO 1+D;CLEAR ;FC=0;BC=7
520 PRINT "FROM",#2,J,#2,K,#2,L
530 PRINT "SUB WAS"
540 IF J>YPRINT "NORTH",
550 IF J<YPRINT "SOUTH",
560 IF J#YIF K#XPRINT " AND ",
570 IF K<XPRINT "EAST"
580 IF K>XPRINT "WEST"
590 PRINT " ";IF L>ZPRINT "SHOT TOO LOW"
600 IF L<ZPRINT "SHOT TOO HIGH"
610 IF L=ZPRINT "DEPTH OK"
620 INPUT "ENTER TARGET DATA"J,K,L
621 (&(21)=255;(&(23)=255;CLEAR ;PRINT "MISSILE ON THE WAY";FC=7;BC=0
623 FOR A=-40TO 40;BOX Ac2,A,1,3,3;BOX -40-Ac2,-40,10,2,3;FOR B=1TO 10;NEXT B
624 BOX Ac2,A,1,3,3;BOX -40-Ac2,-40,10,2,3;NEXT A
626 (&(21)=0;(&(23)=0;FOR A=40TO -40STEP -1;BOX 20,A,1,3,3;FOR B=1TO 10;NEXT B;BO
X 20,A,1,3,3;NEXT A
628 FOR A=10TO 30;MU="!";LINE 20,-40,0;LINE A,-40+RND (15),3;NEXT A
640 IF Y=JIF X=KIF Z=L GOTO 900
650 NEXT C
660 CLEAR ;PRINT "ABANDON SHIP";PRINT "YOU HAVE BEEN TORPEDOED"
670 BOX 0,-20,50,5,1;BOX 22,-18,4,5,1;BOX 10,-16,1,6,1;BOX -5,-18,5,5,1
690 FOR A=1TO 2;FOR B=-20TO 20STEP 2;LINE -0,-20,0;MU="!";LINE B,10,3;NEXT B;NE
XT A
700 FOR A=1TO 10;(&(22)=255;FOR B=60TO 10STEP -1;(&(18)=B;NEXT B;(&(22)=0;FOR B=1T
O 30;NEXT B;NEXT A;(&(22)=0
710 FOR A=-40TO 40;LINE -78,A,0;LINE 78,A,1;NEXT A
890 GOTO 950
900 CLEAR ;PRINT "BOOM ! !!"
910 BOX 0,0,50,8,1;BOX 10,5,8,5,1;BOX 25,0,4,6,1;BOX -25,0,6,4,1
920 FOR A=-30TO 30STEP 2;LINE 0,0,0;MU="!";BC=7;LINE A,10+RND (30),3;BC=0;NEXT
A
950 CLEAR ;PRINT "DO YOU WANT TO";PRINT "TRY AGAIN?"
960 PRINT "1.YES 2.NO"
970 IF (&(23)=8GOTO 100
975 IF (&(22)=8GOTO 1000
980 GOTO 970
1000 CLEAR ;PRINT "OK I HOPE YOU ENJOYED";PRINT "YOURSELF"

```



**POWER SUPPLY** The special transformer used by Bally (Fig. 1) can be replaced by a combination of three separate transformers as shown in Fig. 2 for a home-built supply. Assure that the secondaries are in phase - that is, the voltage across pins 1 and 3 should be 20, and across 1 and 4 it should be 32. If not, reverse one set of connections and retest.

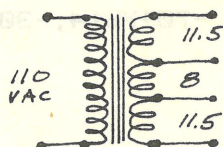


FIG 1

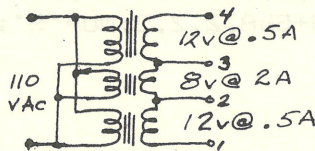


FIG 2

The above data from Al Rathmell

**TAPE DROPOUT???** One subscriber has reported that he has lost programs after a period of six months or so. All he gets are ?? Improper storage, tape decay? Any suggestions/solutions welcome.

**PROGRAMS NEEDED** This newsletter lives on subscriber contributions, about 85% of the material comes from the readers, and the stock of material is pretty low. I need tutorials, programs, items of interest...

**DIAGNOSTIC CARTRIDGE?** The attached bit of material is from the 2-page JS&A ad that enticed most of us old-timers into buying the Bally. "Unit" was later changed to mean "Add-On Memory". Regardless, we never saw such a beast. As a second best (?), it is true that there is a diagnostic device that can be used to check out the Bally. This is cabled to the 50-pin connector and includes a 2716 PROM, two LED alphanumeric readouts and their drivers, and some bits and pieces. Once set up, the program in the 2716 reviews just about everything in the Bally - memory, keypad, control ports - and if it finds something wrong, it says HE IP and gives a code which can be looked up to get the specifics. It also includes a subroutine that places a veritable rainbow of colors all over the screen. Another subroutine allows the entry of machine code programs from the keypad, using a new overlay chart. Those of you who may be interested in this device, I can provide a copy of the listing, the instructions/code, and a schematic, for \$6.50 ppd. The program is called "BALCHECK", and the listing was provided by Tom Wood.

The Bally Computer is also self-diagnostic. We have developed a cartridge that lets the unit itself check every integrated circuit and every solid-state component and which displays any malfunction on your TV screen. Then all you do is send the circuit board or your entire unit to JS&A's service-by-mail center for prompt replacement. The cartridge will be sent free-of-charge to JS&A customers after you receive your unit.

**NEW BALLY COMPUTER** is to be made available. This is a highly graphics-oriented device, complete with ZGRASS language and with all sorts of visual and aural capabilities. It will have lots of features that we thought we were going to get with the Add-On (when the above ad came out) for about 500 bucks. That price went up to 650 after a while... the new machine, with monitor, will be in the 3000. neighborhood. A dual audio cassette interface operating at 2000 baud with provisions for disc as well. The memory has 32K of RAM, plus the ZGRASS in ROM. The design utilizes a card rack system so that additions are just plugged into slots. Certainly a competitor for the APPLE III if they pursue it.



# ARCADIAN

This is a page from  
BALCHECK and is a  
listing of the program to effect machine code from the keypad.

		1839 ;		Enter Machine Code From Keypad
27BA	CDFF24	1890 A27BA	CALL	A24FF ; Set colors.
27BD	CD1625	1891	CALL	A2516 ; "ENTR 4-DIGT HEX"
27C0		1892	SYSSUK	STRDIS
27C0	FF	1893+	RST	39H
27C1	35	1894+	DB	STRDIS+1
27C2	04	1898	DB	4
27C3	32	1899	DB	50
27C4	0C	1900	DB	00001100B
27C5	8B24	1901	DW	T248B ; 'STRT ADDR'
27C7	3E01	1902	LD	A,1 ; Get 4 digits
27C9	CD7125	1903	CALL	A2571
27CC	E5	1904	PUSH	HL ; Save start
27CD	E5	1905	PUSH	HL
27CE	CDCF25	1906	CALL	A25CF
27D1	CDFF24	1907	CALL	A24FF
27D4		1908	SYSSUK	STRDIS
27D4	FF	1909+	RST	39H
27D5	35	1910+	DB	STRDIS+1
27D6	04	1914	DB	4
27D7	28	1915	DB	40
27D8	0C	1916	DB	00001100B
27D9	9524	1917	DW	T2495 ; 'ENTR 2-DIGT HEX'
27DB		1918	SYSSUK	STRDIS
27DB	FF	1919+	RST	39H
27DC	35	1920+	DB	STRDIS+1
27DD	04	1924	DB	4
27DE	32	1925	DB	50
27DF	0C	1926	DB	00001100B
27E0	A524	1927	DW	T24A5 ; 'DATA'
27E2		1928	SYSSUK	STRDIS
27E2	FF	1929+	RST	39H
27E3	35	1930+	DB	STRDIS+1
27E4	04	1934	DB	4
27E5	5A	1935	DB	90
27E6	0C	1936	DB	00001100B
27E7	F324	1937	DW	T24F3 ; '"GO" TO RUN'
27E9	CDCF25	1938 A27E9	CALL	A25CF ; Delay
27EC	AF	1939	XOR	A ; Get 2 digits
27ED	CD7125	1940	CALL	A2571
27F0	78	1941	LD	A,B
27F1	FE18	1942	CP	24
27F3	2003	1943	JR	NZ,A27F8
27F5	E1	1944	POP	HL ; "GO" key
27F6	E1	1945	POP	HL
27F7	E9	1946	JP	(HL)
		1947 ;		
27F8	D1	1948 A27F8	POP	DE
27F9	7C	1949	LD	A,H
27FA	12	1950	LD	(DE),A
27FB	13	1951	INC	DE
27FC	D5	1952	PUSH	DE
27FD	18EA	1953	JR	A27E9
		1954 ;		
27FF	37	1955	DB	37H ; Checksum byte
		1956 ;		
2800	(0000)	1957	END	Eighty - five



## ADS

FOR SALE Bally Computer System with Cassette interface, Basic, BASEBALL, FOOTBALL, PINBALL, SEAWOLF, 280-ZZAP, BLACKJACK cartridges plus 2 cassettes with assorted programs. Computer is new and has gone thru Bally quality control. \$475 or closest offer Robert Marzig 816 6th Ave NE Minot, ND 58701 701-852-6369

L & M Software now has "Electronic Ayatollah Dartboard" and "Rescue Air Drop". Full memory usage, pistol grip controlled. Cost is \$10 complete with documentation. 8599 Framewood Dr., Newburgh IN 47630

FOR SALE Bally Home Library Computer - basic cassette- audio cassette interface- 4 each hand controllers- FOOTBALL, BASEBALL, PANZER ATTACK & MATH 'cades. cost approx \$480 new, will take \$325 or best offer.. Don Brown 1224 S. Broadway, Skiatook, OK 74070 918-396-1424

BACH - 2 part music has been translated by George Moses into Bally and the programs have been taped. George offers these at \$7.50 for the complete selections, in numerical order. 110 E. North St., Brighton MI 48116

which reminds me that they are still having meetings once in a while - contact George for details.

George Collins reports that he currently has no material for sale.

FIRST CLASS

Eighty - six

## ARCADIAN

SOURCE TCD 959

Robert Fabris, RAM-rodger

3626 Morrie Drive

San Jose, CA 95127

FIRST CLASS